REMARKS

Claims 1 – 54 are pending in the application. Claims 44 – 54 stand withdrawn from consideration pursuant to a Restriction Requirement. Specifically, in response to the Examiner's Restriction Requirement, Applicants elected, with traverse, to prosecute claims 1 – 43 in this application. Claims 1 – 43 stand rejected under 35 USC Section 103. Applicants request reconsideration of the rejection of the claims and reexamination of the application in light of the following remarks.

Claim Interpretation

As a preliminary matter, Applicants submit that claims 36 – 39 are properly construed as reciting a feature or characteristic of the claimed fluid processing apparatus, which feature or characteristic should be given patentable weight. The Examiner asserts, instead, that the claims are directed to a function of the device and, thus, the Examiner afforded no patentable weight to the recited claim limitations. Applicants respectfully traverse this position taken by the Examiner. Claim 36, for example, defines a fluid processing apparatus in accordance with claim 1 wherein "the manifold body is operative at fluid pressure in the microfluidic junction greater than 25 PSI." The quoted language defines a characteristic of the claimed fluid processing apparatus. It does not recite a function of the device. As an expressly recited characteristic of the claimed fluid processing apparatus, it is entitled to full patentable weight. Applicants request that claims 36 – 39 be reexamined accordingly.

Claims 1 – 43 are Patentable Over Yasuda et al in View of Khuri-Yakub et al

Claims 1 – 43 are rejected under Section 103(a) over Yasuda et al (U.S. 6,244,738) in view of Khuri-Yakub et al (U.S. 2002/0083711). The rejection is respectfully traversed.

Claim 1, and claims 2 – 42, each of which depends either directly or indirectly from claim 1, are patentable over Yasuda et al in view of Khuri-Yakub et al, because the citations fail to teach or suggest fluid processing apparatus comprising a fluid-handling manifold comprising a manifold body having a first fluid duct in communication with a second fluid duct at a microfluidic junction which is operative to pass a flow of fluid comprising fluid from the first duct and fluid from the second duct, and a transducer operative to generate ultrasonic acoustic traveling wave radiation into fluid in the microfluidic junction from an active surface toward a non-reflective boundary of the microfluidic junction not more than 300 microns from the active surface.

Moreover, the rejection is in error because Yasuda et al and Khuri-Yakub et al cannot be properly combined. Yasuda et al is directed to a stirrer for mixing a sample solution using ultrasonic vibrators arranged in a microtube. Yet nothing is said in Yasuda et al about the size of the microtubes. In sharp contrast, Khuri-Yakub et al teaches that its micromachined ultrasonic transducers (cMUTs) are used in applications for which traditional ultrasonic devices are too large. Specifically, Khuri-Yakub et al states:

> "Microfluidic systems employ microchannels in which chemical and biochemical materials are transported, mixed, separated and detected...." "Ultrasonic devices using piezoelectric materials have been successfully used for measurements of flow, physical properties and pressure of fluids and gases in many applications. **Most of these devices are bulky, and they cannot be easily integrated to microfluidic systems for several reasons. With a few exceptions, piezoelectric**

materials are not compatible with other processing steps required for the fluidic chips. In addition, piezoelectric transducers for bulk wave excitation cannot be scaled down easily so as to fit in microfluidic channels without degrading their performance." (Column 1, paragraphs [0003 - 0004].)

Thus, we see that Khuri-Yakub et al teaches away from combining its cMUTs with traditional microfluidic systems such as Yasuda et al.

In view of their express incompatability, the Khuri-Yakub et al teaching cannot be combined with that of Yasuda et al. Thus, the rejection is without proper basis and should be withdrawn.

Furthermore, no proper or adequate support is provided for the rejection of claims 3 – 20 and 43. The Examiner asserts broadly that microcomponents of transducers, mixers, etc. are all known for use in combination with a microchannel in the art microfluidic processors. However, no support is provided by the Examiner for this position. No teaching is cited to support the Examiner's position. An unsupported assertion cannot support the rejection. The rejection is without prima fascia support and should be withdrawn.

With respect to claim 3 in particular, no art of record teaches or suggests a fluid processing apparatus in accordance with claim 1 further comprising a fluidic component integral with the fluid-handling manifold and operative on fluid in the manifold body. Accordingly, claim 3 is further patentable (i.e., beyond its patentability based on dependence from claim 1) for this additional reason. Similarly, claims 4 – 20 are likewise further patentable, since each depends either directly or indirectly from claim 3.

With particular reference to claim 7, nothing in the art of record teaches or suggests a fluid processing apparatus in accordance with claim 3, wherein the fluid component is a

mechanical mixer operative to mix fluid in a manifold body. For this additional reason, claim 7 is patentable over the art of record.

With reference to claim 8, the art of record does not teach or suggest a fluid processing apparatus in accordance with claim 3 wherein the fluid component is a sensor operative to detect a condition of fluid in the manifold body. The combination of a mechanical mixer operative to mix fluid in a manifold body which has a microfluidic junction and a transducer operative to generate ultrasonic acoustic traveling wave radiation into such microfluidic junction simply cannot be said to be obvious over the art of record. Nothing in the art of record teaches or suggests any such apparatus.

With respect to claim 8, nothing in the art of record teaches or suggests a fluid processing apparatus in accordance with claim 3 wherein the fluid component is a sensor operative to detect a condition of fluid in the manifold body. Accordingly, claim 8 is further patentable over the art of record for this additional reason. Similarly, claims 9 – 15 are further patentable over the art of record, since each depends directly from claim 8.

With reference to claim 9, the art of record fails to teach or suggest a fluid processing apparatus in accordance with claim 8 wherein the sensor is operative to detect the temperature in the manifold body. Accordingly, claim 9 is further patentable for this additional reason.

Claim 10 is further patentable over the art of record because the art of record fails to teach or suggest a fluid processing apparatus in accordance with claim 8 wherein the sensor is operative to detect the pressure of fluid in the manifold body. Accordingly, claim 10 is further patentable for this additional reason.

With respect to claim 11, the art of record fails to teach or suggest fluid processing apparatus in accordance with claim 8 wherein the sensor is operative to detect an optical property of fluid in the manifold body. Nothing in the art of record suggests an optical sensor in this context, an optical sensor integral with a fluid handling manifold as defined by claim 1. Accordingly, claim 11 is further patentable for this additional reason.

With respect to claim 12, the art of record fails to teach or suggest fluid processing apparatus in accordance with claim 8 wherein the sensor is operative to detect fluid flow rate of fluid in the manifold body. Accordingly, claim 12 is further patentable for this additional reason.

With respect to claim 13, the art of record fails to teach or suggest a fluid processing apparatus in accordance with claim 8 wherein the sensor is a dielectric constant sensor. Accordingly, claim 13 is further patentable for this additional reason.

With respect to claim 14, the art of record fails to teach or suggest fluid processing apparatus in accordance with claim 8 wherein the sensor is a viscosity sensor. Accordingly, claim 14 is further patentable for this reason.

With respect to claim 15, the art of record fails to teach or suggest fluid processing apparatus in accordance with claim 8 wherein the sensor is a turbidity sensor. Accordingly, claim 15 is further patentable for this additional reason.

With respect to claim 16, the art of record fails to teach or suggest fluid processing apparatus in accordance with claim 3 wherein the fluid component is a valve operative to control a flow of fluid in the manifold body. In this respect, it should be understood that such valve is integral with the fluid-handling manifold comprising a transducer as defined in claim 1. Accordingly, claim 16 is further patentable for this additional reason.

Claim 17 depends from claim 16 and is further patentable on that basis, moreover, the art of records fails to teach or suggest fluid processing apparatus in accordance with claim 16 wherein the microfluidic junction is in such valve operative to control a flow of fluid in the manifold body, and the transducer is operative to generate ultrasonic acoustic traveling wave radiation into the valve. Accordingly, claim 17 is yet further patentable for this additional reason.

With respect to claim 18, the art of record fails to teach or suggest a fluid processing apparatus in accordance with claim 3 wherein the fluid component is a fluid pump. Accordingly, claim 18 is further patentable over the art of record for this additional reason.

With respect to claim 19, the art of record fails to teach or suggest the fluid processing apparatus in accordance with claim 3, wherein the fluid component is a heater. No such teaching is found in the art of record. Accordingly, claim 19 should be found patentable for this additional reason.

Claim 20 is further patentable over the art of record for the additional reason that the art of record fails to teach or suggest fluid processing apparatus in accordance with claim 3 wherein the fluid component is a cooler. Claim 3 should be found allowable for this additional reason. The additional dependant claims under consideration are believed to be patentable on the basis that they depend from claim 1 or other claims discussed above and, in addition, on the basis of the further limitations recited therein.

With respect to independent claim 43, the rejection is seen to be in error because the art of record fails to teach or suggest fluid processing apparatus comprising a fluid-handling manifold comprising a laminated plastic manifold body having a first fluid duct in fluid

communication with a second fluid duct at a microfluidic junction operative to pass fluid received from the first duct and fluid received from the second duct, a transducer operative to generate electronic acoustic traveling wave radiation into fluid in the microfluidic junction from an active surface toward a non-reflective boundary of the microfluidic junction, and a sensor integral with the fluid-handling manifold and operative to the tactic condition of fluid in the manifold body. Accordingly, the rejection should be withdrawn and claim 43 should be found allowable.

The arguments presented above with respect to claim 1 are applicable here as well. Accordingly, again, Applicants requests that the rejection of claim 43 be withdrawn.

Conclusion

In view of the foregoing remarks, Applicants submit that all of the claims under consideration in the application are in condition for allowance. Upon indication of their allowability, Applicants will cancel the withdrawn claims 44 – 54 from the application. Accordingly, Applicants request allowance of claims 1 – 43.

Date: 7 Dec 2005

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